Coarsening in Solid-Liquid Mixtures-2 (CSLM-2)

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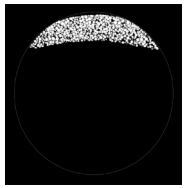
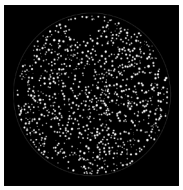
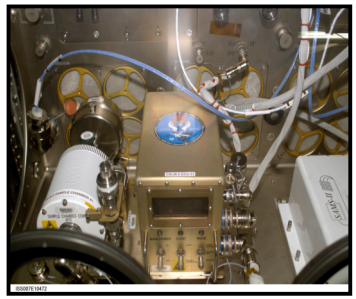


Ground-Based Sample.



CSLM-1: Sample from MSL-1 mission.



Flight SPU#1 and Flight ECU#1 installed in the MSG on board ISS.

Objective:

- Support the development and accuracy of theoretical models of the Ostwald Ripening (coarsening) process.
- Determine the factors controlling the morphology of solid-liquid mixtures during coarsening.
- For a two-phase eutectic mixture, determine the steady state dependence of the rate constant, particle size distribution and particle spatial distribution on the volume fraction of the coarsening phase.

Relevance/Impact:

- CSLM-2 will aid in materials selection for high temperature materials, such as nuclear propulsion and waste heat coolant loops.
- CSLM-2 results will provide results that will improve design codes that are based on incomplete models and databases.

Development Approach:

- CSLM-2 hardware design based on CSLM which flew on MSL-1.
- Electrical Control Unit (ECU) and support hardware on-orbit. Used successfully in the MSG with Sample Processing Unit (SPU) # 1.
- Samples are developed by the PI and then integrated into the SPUs by the engineering team.
- Launched 5 SPU's with high volume fractions on Flight 13A.1 on 8 August 2007. The three of the five SPU's were successfully processed on board the ISS during Inc 16 on 1-30 Dec 2007.
- Launched 3 SPU's on Flight 1J/A on 11 March 2008. The 3 SPU's started the on orbit operations in the MSG Facility during Inc 17 on 14-30 April 2008.

ISS Resource Requirements

Accommodation (carrier)	Microgravity Science Glovebox
Upmass (kg) (w/o packing factor)	19.5 (6.5kg/SPU) 3 SPU's up
Volume (m^3) (w/o packing factor)	0.04 for 3 SPU's
Power (kw) (peak)	0.15 operate one SPU at time
Crew Time (hrs) (installation/operations)	14 hours crew time
Autonomous Ops Time (hrs)	10, 4, and 24 hours
Launch/Increment	1JA/Increment 17

Project Life Cycle Schedule

Milestones	ICR	CDR	VRR	Safety	FHA	Launch	Ops	Return	Final Report
Actual	10/1998	9/2000	9/2000	5/2007	7/2007	8/2007	Inc. 16	Inc. 16	Return+18m
Actual/Baseline				1/2008	2/2008	3/2008	Inc.17	Inc. 17	Return+18m
Documentation	Website:http://spaceflightsystems.grc.nasa.gov/Advanced/ISSResearch/MSG/CSLM-2 eRoom:https://collaboration.grc.nasa.gov/eRoom/NASAc1f1/ISSHumanResearchProjectsOffice			SRD:same as CSLM-2 project website EDMP:http://edmp.grc.nasa.gov			Project Plan:https://collaboration.grc.nasa.gov/eRoom/NASAc1f1/ISSResearchProject SEMP:		

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